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Analytical results and sample locality map of stream-sediment, heavy-mineral-concentrate, and rock samples from the Hawk Mountain Wilderness Study Area, Harney County, Oregon

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STUDIES RELATED TO WILDERNESS

Bureau of Land Management Wilderness Study Areas

The Federal Land Policy and Management Act (Public Law 94-579, October 21, 1976) requires the U.S. Geological Survey and the U.S. Bureau of Mines to conduct mineral surveys on certain areas to determine their mineral values, if any. Results must be made available to the public and be submitted to the President and the Congress. This report presents the results of a geochemical survey of the Hawk Mountain Wilderness Study Area (OR-001-146), Harney County, Oregon.

INTRODUCTION

In August 1986, the U.S. Geological Survey conducted a reconnaissance geochemical survey of the Hawk Mountain Wilderness Study Area, Harney County, Oregon.

The Hawk Mountain Wilderness Study Area comprises about 109 mi^2 (283 km^2) in the southwest corner of Harney County, Oregon, and lies about 12 mi (19 km) northwest of Denio, Nevada, and about 32 mi (51 km) southeast of Adel, Oregon (see fig. 1). Access to the study area is provided on the east by an unimproved dirt road which runs along the northeast boundary of the study area, on the west by a graded gravel road which follows the northwest boundary of the study area and continues northward providing access from that direction, and on the south by an unimproved dirt road which passes through Hawksy Walksy Valley in the south central part of the study area. All of these roads lead off from Nevada and Oregon State Highway 140.

The study area is situated in the transition zone between the Basin and Range and Columbia Plateau physiographic provinces. The area is underlain by a sequence over 1,500 ft (457 m) thick of Tertiary rhyolitic to dacitic ash-flow tuffs and flows. Two major sets of faults that trend north-northwest and north-northeast occur within the study area. Rock units present in the study area have been described by Greene (1984) and by Noble and others (1970). The geology of the study areas is included in a geologic map of the Adel 1 X 2 degree quadrangle at a scale of 1:250,000 (Walker and Repenning, 1965).

Elevations in the study area range from a low of about 4,500 ft (1,372 m) along Long Draw at the southeast end of the area up to 7,234 ft (2,204 m) at the peak of Hawks Mountain, giving a topographic relief of 2,374 ft (833 m).

METHODS OF STUDY

Sample Media

Analyses of the stream-sediment samples represent the chemistry of the rock material eroded from the drainage basin upstream from each sample site. Such information is useful in identifying those basins which contain concentrations of elements that may be related to mineral deposits. Heavy-mineral-concentrate samples provide information about the chemistry of certain minerals in rock material eroded from the drainage basin upstream from each sample site. The selective concentration of minerals, many of which may be ore related, permits determination of some elements that are not easily detected in stream-sediment samples.

Analyses of unaltered or unmineralized rock samples provide background geochemical data for individual rock units. On the other hand, analyses of

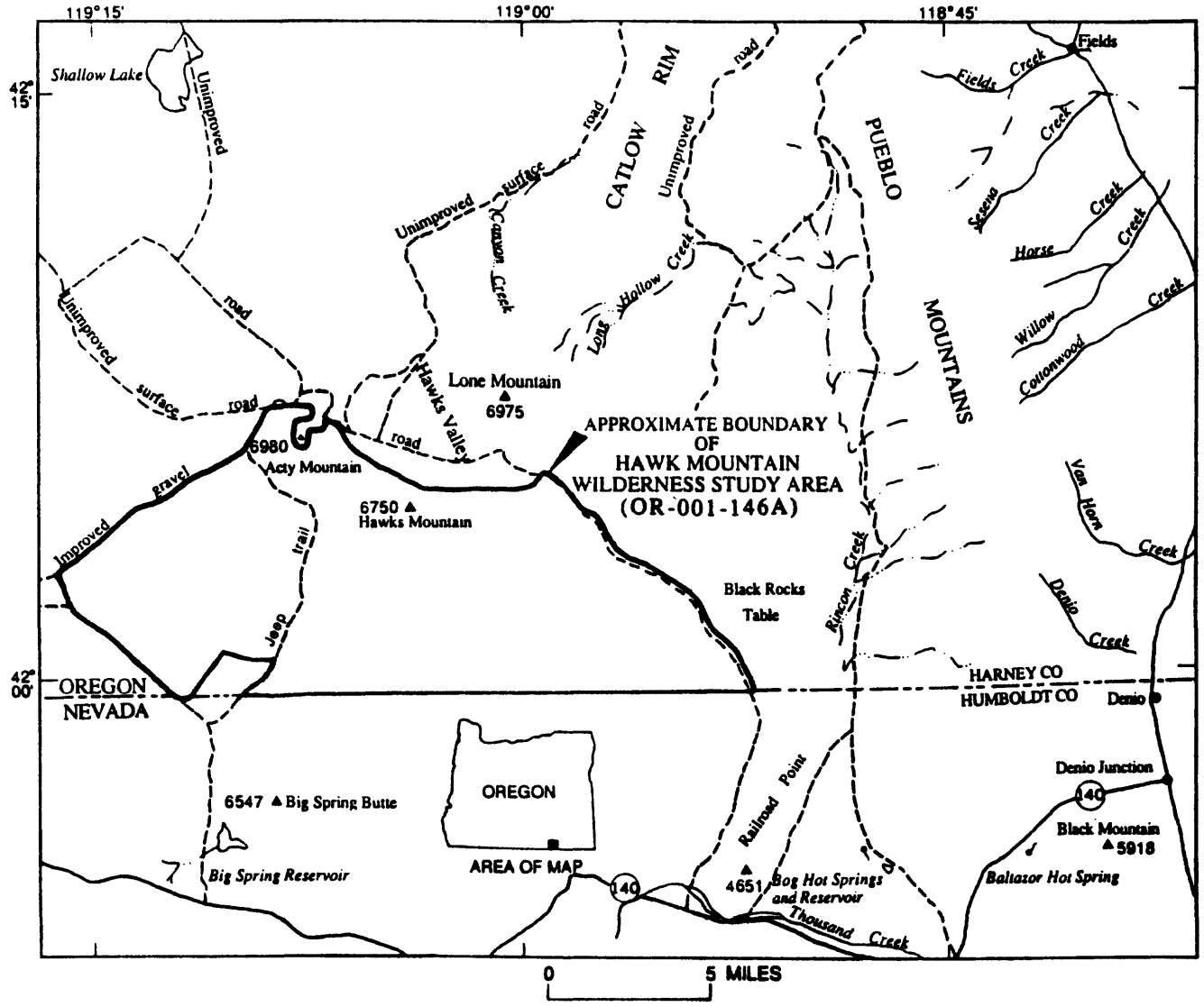

Figure 1. Location of the Hawk Mountain Wilderness Study Area, Harney County, Oregon.

altered or mineralized rocks, where present, may provide useful geochemical information about the major- and trace-element assemblages associated with a mineralizing system.

Sample Collection

Stream-sediment samples were collected at 93 sites and heavy-mineral-concentrate samples were collected at 90 sites (plate 1). Rock samples were collected at 13 sites. Sampling density was about one sample site per 1.2 mi^2 for the stream sediments and heavy-mineral concentrates. The area of the drainage basins sampled ranged from 0.12 mi^2 to 12 mi^2 and averaged 1.7 mi^2.

Stream-sediment samples

The stream-sediment samples consisted of active alluvium collected primarily from first-order (unbranched) and second-order (below the junction of two first-order) streams as shown on USGS topographic maps (scale = 1:24,000) (plate 1). Each sample was composited from several localities within an area that may extend as much as 20 ft from the center of the site symbol plotted on the map.

Heavy-mineral-concentrate samples

Heavy-mineral-concentrate samples were collected from the same active alluvium as the stream-sediment samples. Each bulk sample was screened with a 2.0-mm (10-mesh) screen to remove the coarse material. The less than 2.0-mm fraction was panned until most of the quartz, feldspar, organic material, and clay-sized material were removed.

Rock samples

Rock samples were collected from various types of occurrences in the vicinity of the plotted site location. Descriptions of rock samples are in table 6.

Sample Preparation

The stream-sediment samples were air dried, then sieved using 80-mesh (0.17-mm) stainless-steel sieves. The portion of the sediment passing through the sieve was saved for analysis.

Samples that had been panned in the field were air dried and sieved to -35 mesh; bromoform (specific gravity 2.85) was used to remove the remaining quartz and feldspar. The resultant heavy-mineral sample was separated into three fractions using a large electromagnet (in this case a modified Frantz Isodynamic Separator). The most magnetic material (removed at a setting of 0.25 ampere), primarily magnetite, was not analyzed. The second fraction (magnetic at a setting of 1.75 ampere), largely ferromagnesian silicates and iron oxides, was saved for archival storage. The third fraction (the nonmagnetic material at a setting of 1.75 amperes which may include the nonmagnetic ore minerals, zircon, sphene, etc.) was split using a Jones splitter. One split was hand ground for spectrographic analysis; the other split was saved for mineralogical analysis. (These magnetic separates are the same separates that would be produced by using a Frantz Isodynamic Separator set at a slope of 15° and a tilt of 10° with a current of 0.2 ampere to remove the magnetite and ilmenite, and a current of 0.6 ampere to split the remainder of the sample into paramagnetic and nonmagnetic fractions.)

Rock samples were crushed and then pulverized to minus 0.15 mm with ceramic plates.

Sample Analysis

Spectrographic method

The stream-sediment and rock samples were analyzed for 35 elements and the heavy-mineral-concentrate samples were analyzed for 37 elements using a semiquantitative, direct-current arc emission spectrographic method (modification of Grimes and Marranzino, 1968, and Myers and others, 1961). The elements analyzed and their lower limits of determination are listed in table 1. Spectrographic results were obtained by visual comparison of spectra derived from the sample against spectra obtained from standards made from pure oxides and carbonates. Standard concentrations are geometrically spaced over any given order of magnitude of concentration as follows: 100, 50, 20, 10, and so forth. Samples whose concentrations are estimated to fall between those values are assigned values of 70, 30, 15, and so forth. The precision of the analytical method is approximately plus or minus one reporting interval at the 83 percent confidence level and plus or minus two reporting intervals at the 96 percent confidence level (Motooka and Grimes, 1976). Values determined for the major elements, iron, magnesium, calcium, and titanium, are given in weight percent; all others are given in parts per million (micrograms/gram). Analytical data for samples from the Hawk Mountain Wilderness Study Area, Harney County, Oregon, are listed in tables 3-5.

Chemical methods

Samples from this study area were also analyzed by other analytical methods. Rocks and stream sediments were analyzed for arsenic, bismuth, cadmium, antimony, and zinc using inductively couple plasma-atomic absorption spectroscopy and for gold and mercury using atomic absorption spectroscopy. See table 2 for a more detailed summary of these other chemical methods used.

Analytical results for stream-sediment, heavy-mineral-concentrate, and rock samples are listed in tables 3, 4, and 5, respectively.

DATA STORAGE SYSTEM

Upon completion of all analytical work, the analytical results were entered into the Branch of Geochemistry's computer data base. This data base contains both descriptive geological information and analytical data. Any or all of this information may be retrieved and converted to a binary form (STATPAC) for computerized statistical analysis or publication (VanTrump and Miesch, 1977).

DESCRIPTION OF DATA TABLES

Tables 3-5 list the results of analyses for the samples of stream sediment, heavy-mineral concentrate, and rock, respectively. For the three tables, the data are arranged so that column 1 contains the USGS-assigned sample numbers. These numbers correspond to the numbers shown on the site location map (plate 1). Columns in which the element headings show the letter "s" below the element symbol are emission spectrographic analyses; "aa" indicates atomic absorption analyses; and "icp" indicates inductively coupled plasma-atomic emission spectroscopy. A letter "N" in the tables indicates that a given element was looked for but not detected at the lower limit of determination shown for that element in table 1. For emission spectrographic analyses, a "less than" symbol (<) entered in the tables in front of the lower limit of determination indicates that an element was observed but was below

the lowest reporting value. For AA and ICP analyses, a "less than" symbol (<) entered in the tables in front of the lower limit of determination indicates that an element was below the lowest reporting value. If an element was observed but was above the highest reporting value, a "greater than" symbol (>) was entered in the tables in front of the upper limit of determination. If an element was not looked for in a sample, two dashes (--) are entered in tables 3-5 in place of an analytical value. Because of the formatting used in the computer program that produced tables 3-5, some of the elements listed in these tables (Fe, Mg, Ca, Ti, Ag, and Be) carry one or more nonsignificant digits to the right of the significant digits. The analysts did not determine these elements to the accuracy suggested by the extra zeros.

ACKNOWLEDGMENTS

A number of our colleagues also participated in the collection, preparation and analyses of these samples. We would like to extend our appreciation to these colleagues--Bryan Anderson, Paul Briggs, Suzi Erickson, Tracey Delaney, Dave Detra, Olga Erlich, Tommy Hopkins, Janet Jones-Peace, Al Love, Tom Peacock, Steve Smith, Cliff Taylor, and Eric Welsch.

REFERENCES CITED

Crock, J.G., Briggs, P.H., Jackson, L.L., and Lichte, F.E., 1987, Analytical methods for the analysis of stream sediments and rocks from wilderness study areas: U.S. Geological Survey Open-File Report 87-84, 35 p.

Greene, R.C., 1984, Geologic appraisal of the Charles Sheldon Wilderness Study Area, Nevada and Oregon: U.S. Geological Survey Bulletin 1538-A.

Grimes, D.J., and Marranzino, A.P., 1968, Direct-current arc and alternating-current spark emission spectrographic field methods for the semiquantitative analysis of geologic materials: U.S. Geological Survey Circular 591, 6 p.

Koirtyohann, S.R., and Khalil, Moheb, 1976, Variables in the determination of mercury by cold vapor atomic absorption: Analytical Chemistry, 48, p. 136-139.

Motooka, J.M., and Grimes, D.J., 1976, Analytical precision of one-sixth order semiquantitative spectrographic analyses: U.S. Geological Survey Circular 738, 25 p.

Myers, A.T., Havens, R.G., and Dunton, P.J., 1961, A spectrochemical method for the semiquantitative analyses of rocks, minerals, and ores: U.S. Geological Survey Bulletin 1084-I, p. 1207-1229.

Noble, D.C., McKee, E.H., Smith, J.G., and Korringa, M.K., 1970, Stratigraphy and geochronology of Miocene volcanic rocks in northwestern Nevada, in Geological Survey research 1970: U.S. Geological Survey Professional Paper 700-D, p. D23-D32.

Thompson, C.E., Nakagawa, H.M., and Van Sickle, G.H., 1968, Rapid analysis for gold in geologic materials, in Geological Survey research 1968: U.S. Professional Paper 600-B, p. B130-B132.

VanTrump, George, Jr., and Miesch, A.T., 1977, The U.S. Geological Survey RASS-STATPAC system for management and statistical reduction of geochemical data: Computers and Geosciences, v. 3, p. 475-488.

Walker, G.W., and Repenning, C.A., 1965, Reconnaissance geologic map of the Adel quadrangle, Lake, Harney, and Malheur Counties, Oregon: U.S. Geological Survey Miscellaneous Geologic Investigations Map I-446, scale 1:250,000.

TABLE 1.--Limits of determination for the spectrographic analysis of rocks and stream sediments, based on a 10-mg sample

[The spectrographic limits of determination for heavy-mineral-concentrate samples are based on a 5-mg sample, and are therefore two reporting intervals higher than the limits given for rocks and stream sediments]

Elements	Lower determination limit	Upper determination limit
	Percent	
Calcium (Ca)	.05	20
Iron (Fe) 0.05	20	
Magnesium (Mg)	.02	10
Sodium (Na)	0.2	5
Phosphorus (P)	0.2	10
Titanium (Ti)	.002	1
	Parts per million	
Silver (Ag)	0.5	5,000
Arsenic (As)	200	10,000
Gold (Au) 10	500	
Boron (B) 10	2,000	
Barium (Ba)	20	5,000
Beryllium (Be)	1	1,000
Bismuth (Bi)	10	1,000
Cadmium (Cd)	20	500
Cobalt (Co)	10	2,000
Chromium (Cr)	10	5,000
Copper (Cu)	5	20,000
Gallium (Ga)	5	500
Germanium (Ge)	10	100
Lanthanum (La)	50	1,000
Manganese (Mn)	10	5,000
Molybdenum (Mo)	5	2,000
Niobium (Nb)	20	2,000
Nickel (Ni)	5	5,000
Lead (Pb) 10	20,000	
Antimony (Sb)	100	10,000
Scandium (Sc)	5	100
Tin (Sn) 10	1,000	
Strontium (Sr)	100	5,000
Thorium (Th)	100	2,000
Vanadium (V)	10	10,000
Tungsten (W)	20	10,000
Yttrium (Y)	10	2,000
Zinc (Zn) 200	10,000	
Zirconium (Zr)	10	1,000
Palladium (Pd)*	5	1,000
Platinum (Pt)*	20	1,000

*Determined in heavy-mineral-concentrate samples only. Limits are for heavy-mineral-concentrate samples.

TABLE 2.--Chemical Methods used

Element or constituent determined	Sample type	Method	Determination limit (micrograms/ gram or ppm)	Reference
Gold (Au)	rock and sediments	AA	.1	Modification of Thompson and others, 1968.
Mercury (Hg)	rock and sediments	AA	0.02	Koirtyohann and Khalil, 1976.
Arsenic (As)	rock and sediments	ICP	5	Crock and others, 1987.
Antimony (Sb)		ICP	2	
Bismuth (Bi)		ICP	2	
Cadmium (Cd)		ICP	2	
Zinc (Zn)		ICP	0.1	

Table 3. Results of analyses of stream-sediment samples from the Hawk Mountain Wilderness Study Area, Harney County, Oregon.

Sample	Latitude	Longitude	Ca-pct.	Fe-pct.	Mg-pct.	Na-pct.	P-pct.	Ti-pct.	Ag-ppm	As-ppm
			s	s	s	s	s	s	s	s
HM001CS	42 0 28	118 52 40	3.0	10	2.0	--	--	>1.0	N	N
HM002CS	42 0 46	118 53 31	3.0	5	2.0	--	--	.7	N	N
HM003CS	42 1 19	118 53 51	5.0	5	2.0	--	--	>1.0	N	N
HM004CS	42 1 31	118 54 52	2.0	15	2.0	--	--	>1.0	N	N
HM005CS	42 1 56	118 54 59	2.0	15	2.0	--	--	>1.0	N	N
HM007CS	42 2 54	118 56 43	3.0	5	.7	--	--	>1.0	N	N
HM008CS	42 2 57	118 56 47	3.0	7	1.0	--	--	>1.0	N	N
HM009CS	42 3 23	118 57 45	2.0	5	1.0	--	--	1.0	N	N
HM010CS	42 3 33	118 58 9	1.5	3	.7	--	--	.7	N	N
HM011CS	42 1 14	119 8 46	2.0	15	1.0	--	--	>1.0	N	N
HM012CS	42 2 55	119 8 1	2.0	5	1.0	--	--	1.0	N	N
HM013CS	42 3 24	119 7 42	1.5	5	.7	--	--	1.0	N	N
HM014CS	42 4 50	119 7 40	1.0	3	.7	--	--	1.0	N	N
HM015CS	42 5 20	119 6 33	1.5	7	.7	--	--	>1.0	N	N
HM016CS	42 5 17	119 6 26	1.0	3	.7	--	--	>1.0	N	N
HM017CS	42 4 43	119 12 4	2.0	5	1.0	--	--	>1.0	N	N
HM018CS	42 4 43	119 12 35	3.0	5	1.0	--	--	>1.0	N	N
HM019CS	42 0 45	118 55 29	3.0	7	2.0	--	--	>1.0	N	N
HM020CS	42 0 48	118 55 33	1.5	5	1.5	--	--	1.0	N	N
HM021CS	42 2 15	118 57 3	2.0	5	1.0	--	--	>1.0	N	N
HM022CS	42 2 11	118 57 0	1.5	>20	1.0	--	--	>1.0	N	N
HM023CS	42 1 51	118 57 38	2.0	5	1.0	--	--	>1.0	N	N
HM024CS	42 1 33	118 58 10	2.0	5	1.0	--	--	>1.0	N	N
HM025CS	42 1 34	118 58 14	2.0	5	1.0	--	--	>1.0	N	N
HM026CS	42 1 45	118 58 39	2.0	5	.7	--	--	>1.0	N	N
HM027CS	42 1 42	118 58 43	1.5	5	.7	--	--	1.0	N	N
HM028CS	42 1 5	118 59 31	2.0	5	1.0	--	--	>1.0	N	N
HM029CS	42 1 2	118 59 25	2.0	20	1.5	--	--	>1.0	N	N
HM030CS	42 0 30	119 0 15	2.0	10	1.5	--	--	>1.0	N	N
HM031CS	42 0 33	119 1 40	1.0	5	1.0	--	--	.7	N	N
HM032CS	42 1 36	119 1 53	1.0	3	1.0	--	--	1.0	N	N
HM033CS	42 2 36	118 59 4	1.0	5	1.0	--	--	1.0	N	N
HM034CS	42 1 54	118 59 39	.7	2	.7	--	--	.3	N	N
HM035CS	42 2 17	119 0 22	1.0	5	.7	--	--	1.0	N	N
HM036CS	42 4 3	118 59 21	1.0	5	.7	--	--	>1.0	N	N
HM037CS	42 3 59	118 59 19	1.5	3	1.0	--	--	1.0	N	N
HM038CS	42 3 57	118 59 15	1.0	15	1.0	--	--	>1.0	N	N
HM039CS	42 4 48	119 0 23	1.5	5	1.0	--	--	>1.0	N	N
HM040CS	42 4 13	119 0 21	2.0	7	1.0	--	--	>1.0	N	N
HM041CS	42 2 45	119 2 29	1.5	5	1.0	--	--	>1.0	N	N
HM042CS	42 2 45	119 2 29	2.0	10	1.0	--	--	>1.0	N	N
HM043CS	42 2 12	119 3 27	1.5	5	1.0	--	--	.7	N	N
HM044CS	42 1 3	119 4 4	2.0	7	1.0	--	--	>1.0	N	N
HM045CS	42 2 35	119 4 23	1.0	5	.7	--	--	1.0	N	N
HM046SS	42 3 24	119 4 43	1.5	5	1.0	--	--	1.0	N	N

Table 3. Results of analyses of stream-sediment samples from the Hawk Mountain Wilderness Study Area, Harney County, Oregon.--Continued

Sample	Au-ppm s	B-ppm s	Ba-ppm s	Be-ppm s	Bi-ppm s	Cd-ppm s	Co-ppm s	Cr-ppm s	Cu-ppm s	Ga-ppm s	Ge-ppm s
HM001CS	N	20	700	1.0	N	N	30	100	50	--	--
HM002CS	N	50	500	1.0	N	N	20	100	50	--	--
HM003CS	N	20	500	1.0	N	N	15	50	30	--	--
HM004CS	N	30	500	1.0	N	N	30	150	50	--	--
HM005CS	N	30	500	1.0	N	N	30	100	50	--	--
HM007CS	N	30	700	1.0	N	N	20	50	20	--	--
HM008CS	N	30	500	1.0	N	N	20	100	30	--	--
HM009CS	N	30	500	1.0	N	N	20	50	30	--	--
HM010CS	N	50	500	1.0	N	N	15	50	20	--	--
HM011CS	N	20	300	1.0	N	N	20	100	50	--	--
HM012CS	N	50	500	1.0	N	N	20	70	50	--	--
HM013CS	N	50	300	1.0	N	N	15	70	30	--	--
HM014CS	N	50	500	1.0	N	N	15	70	30	--	--
HM015CS	N	50	500	1.0	N	N	15	70	50	--	--
HM016CS	N	30	300	1.5	N	N	20	30	30	--	--
HM017CS	N	50	500	1.5	N	N	20	100	50	--	--
HM018CS	N	50	500	1.5	N	N	20	50	50	--	--
HM019CS	N	30	500	1.5	N	N	30	100	50	--	--
HM020CS	N	50	300	1.5	N	N	20	50	30	--	--
HM021CS	N	50	500	1.5	N	N	20	50	30	--	--
HM022CS	N	50	500	<1.0	N	N	70	150	50	--	--
HM023CS	N	50	500	1.0	N	N	20	70	30	--	--
HM024CS	N	50	500	1.5	N	N	20	70	30	--	--
HM025CS	N	50	500	1.5	N	N	15	30	30	--	--
HM026CS	N	50	500	2.0	N	N	20	100	30	--	--
HM027CS	N	30	500	1.5	N	N	20	30	30	--	--
HM028CS	N	30	500	1.5	N	N	20	20	30	--	--
HM029CS	N	20	500	1.0	N	N	30	100	50	--	--
HM030CS	N	20	500	1.5	N	N	20	100	50	--	--
HM031CS	N	50	500	2.0	N	N	15	70	20	--	--
HM032CS	N	30	700	2.0	N	N	15	50	30	--	--
HM033CS	N	30	500	1.5	N	N	15	20	30	--	--
HM034CS	N	30	300	2.0	N	N	<10	20	15	--	--
HM035CS	N	50	300	2.0	N	N	15	50	30	--	--
HM036CS	N	50	500	2.0	N	N	20	20	20	--	--
HM037CS	N	30	500	1.5	N	N	15	20	20	--	--
HM038CS	N	30	500	1.0	N	N	20	50	30	--	--
HM039CS	N	30	700	2.0	N	N	20	50	30	--	--
HM040CS	N	50	500	2.0	N	N	20	100	30	--	--
HM041CS	N	50	500	2.0	N	N	15	100	30	--	--
HM042CS	N	30	700	2.0	N	N	20	100	50	--	--
HM043CS	N	50	500	1.5	N	N	15	70	30	--	--
HM044CS	N	50	700	1.5	N	N	20	50	30	--	--
HM045CS	N	50	500	1.5	N	N	15	20	20	--	--
HM046SS	N	50	500	2.0	N	N	20	20	20	--	--

Table 3. Results of analyses of stream-sediment samples from the Hawk Mountain Wilderness Study Area, Harney County, Oregon.--Continued

Sample	La-ppm s	Mo-ppm s	Mn-ppm s	Nb-ppm s	Ni-ppm s	Pb-ppm s	Sb-ppm s	Sc-ppm s	Sn-ppm s	Sr-ppm s	Th-ppm s
HM001CS	<50	N	3,000	20	30	20	N	50	N	500	N
HM002CS	<50	5	1,000	<20	20	30	N	15	N	300	N
HM003CS	50	<5	1,000	<20	15	30	N	20	N	700	N
HM004CS	N	<5	5,000	<20	20	20	N	30	N	500	N
HM005CS	N	<5	5,000	<20	20	30	N	30	N	500	N
HM007CS	<50	<5	1,500	<20	10	50	N	20	N	500	N
HM008CS	<50	N	1,000	N	15	50	N	20	N	500	N
HM009CS	50	N	700	N	15	50	N	20	N	500	N
HM010CS	50	N	1,000	<20	10	50	N	15	N	300	N
HM011CS	70	N	5,000	20	15	30	N	20	N	500	N
HM012CS	50	N	2,000	<20	15	50	N	15	N	500	N
HM013CS	50	<5	1,500	<20	15	50	N	10	N	300	N
HM014CS	70	N	1,000	<20	15	50	N	15	N	300	N
HM015CS	70	10	5,000	30	15	50	N	20	N	300	N
HM016CS	100	N	1,500	20	10	50	N	15	N	200	N
HM017CS	70	N	1,500	<20	15	50	N	20	N	300	N
HM018CS	100	N	1,500	N	15	50	N	20	N	500	N
HM019CS	50	N	2,000	20	15	30	N	30	N	500	N
HM020CS	<50	N	700	<20	15	50	N	20	N	200	N
HM021CS	N	N	1,000	20	10	50	N	20	N	500	N
HM022CS	N	N	5,000	20	20	20	N	70	N	200	N
HM023CS	50	N	1,500	<20	15	50	N	20	N	200	N
HM024CS	70	N	2,000	<20	15	50	N	20	N	300	N
HM025CS	N	N	2,000	<20	10	30	N	20	N	300	N
HM026CS	70	N	2,000	<20	10	30	N	20	N	300	N
HM027CS	<50	N	1,000	<20	10	30	N	15	N	200	N
HM028CS	150	N	1,000	<20	10	30	N	20	N	300	N
HM029CS	N	N	5,000	20	15	20	N	30	N	200	N
HM030CS	50	N	3,000	N	15	30	N	20	N	500	N
HM031CS	100	<5	1,500	N	10	30	N	10	N	200	N
HM032CS	50	5	2,000	20	15	30	N	15	N	300	N
HM033CS	<50	5	2,000	<20	15	30	N	15	N	300	N
HM034CS	70	5	1,000	<20	10	30	N	10	N	150	N
HM035CS	70	7	2,000	20	10	50	N	10	N	200	N
HM036CS	50	<5	1,500	<20	10	50	N	10	N	200	N
HM037CS	<50	<5	1,000	N	10	30	N	10	N	300	N
HM038CS	<50	5	1,500	20	10	30	N	15	N	200	N
HM039CS	70	N	2,000	<20	15	30	N	15	N	500	N
HM040CS	50	N	1,000	<20	15	30	N	10	N	300	N
HM041CS	50	<5	1,000	<20	10	30	N	10	N	300	N
HM042CS	50	N	1,500	N	15	15	N	15	N	300	N
HM043CS	50	5	1,000	<20	15	20	N	10	N	300	N
HM044CS	70	5	1,500	<20	15	30	N	10	N	300	N
HM045CS	70	5	1,500	<20	15	50	N	10	N	200	N
HM046SS	100	5	1,500	<20	20	50	N	10	N	200	N

Table 3. Results of analyses of stream-sediment samples from the Hawk Mountain Wilderness Study Area, Harney County, Oregon.--Continued

Sample	V-ppm s	W-ppm s	Y-ppm s	Zn-ppm s	Zr-ppm s	Au-ppm aa	Hg-ppm aa	As-ppm icp	Bi-ppm icp	Cd-ppm icp	Sb-ppm icp	Zn-ppm icp
HM001CS	150	N	30	N	200	N	N	<5	<2	.4	<2	91
HM002CS	70	N	20	N	150	N	N	<5	<2	.2	<2	41
HM003CS	70	N	30	N	300	N	N	<5	<2	.2	<2	47
HM004CS	200	N	20	<200	200	N	N	<5	<2	.5	<2	87
HM005CS	200	N	20	<200	200	N	N	<5	3	.8	<2	150
HM007CS	50	N	50	N	200	N	N	<5	<2	.3	<2	72
HM008CS	70	N	30	N	150	N	N	<5	<2	.4	<2	76
HM009CS	70	N	50	N	150	N	.04	<5	<2	.2	<2	52
HM010CS	50	N	30	N	200	N	N	<5	<2	.3	<2	36
HM011CS	150	N	30	N	300	N	N	<5	2	.2	<2	60
HM012CS	100	N	30	N	150	N	.04	<5	<2	.4	<2	62
HM013CS	100	N	50	N	300	N	N	<5	<2	.4	<2	75
HM014CS	100	N	30	N	300	N	N	<5	<2	.4	<2	65
HM015CS	100	N	50	N	300	N	.04	<5	<2	.4	<2	120
HM016CS	100	N	50	N	500	N	N	7	<2	.2	<2	72
HM017CS	150	N	30	N	200	N	N	5	<2	.4	<2	82
HM018CS	100	N	50	N	150	N	.04	<5	<2	.4	<2	54
HM019CS	150	N	50	N	300	N	N	<5	<2	.5	<2	82
HM020CS	100	N	30	N	200	N	.04	<5	<2	.3	<2	59
HM021CS	100	N	30	N	300	N	N	<5	<2	.2	<2	64
HM022CS	500	N	50	500	500	N	.04	<5	3	1.9	<2	410
HM023CS	150	N	50	N	300	N	N	<5	<2	.3	<2	89
HM024CS	100	N	50	N	200	N	N	<5	<2	.3	<2	92
HM025CS	100	N	50	N	200	N	N	<5	<2	.3	<2	87
HM026CS	150	N	50	N	200	N	N	<5	<2	.2	<2	56
HM027CS	100	N	20	N	150	N	N	<5	<2	.2	<2	79
HM028CS	100	N	50	N	200	N	N	<5	<2	.3	<2	95
HM029CS	200	N	50	200	300	N	N	<5	<2	.5	<2	220
HM030CS	150	N	50	<200	300	N	N	<5	2	.2	<2	99
HM031CS	50	N	50	N	100	N	.02	<5	<2	.2	<2	56
HM032CS	70	N	30	N	200	N	.04	<5	<2	.4	<2	76
HM033CS	100	N	20	N	200	N	.02	<5	<2	.5	<2	79
HM034CS	30	N	50	N	300	N	.04	<5	<2	.3	<2	66
HM035CS	50	N	50	N	200	N	.06	6	<2	.5	<2	98
HM036CS	100	N	50	N	300	N	.02	<5	<2	.4	<2	85
HM037CS	100	N	30	N	150	N	.06	<5	<2	.3	<2	77
HM038CS	150	N	30	<200	300	N	.02	5	2	.4	<2	160
HM039CS	100	N	50	N	300	N	.02	7	<2	.6	<2	120
HM040CS	100	N	30	<200	200	N	.06	5	<2	.3	<2	68
HM041CS	100	N	30	N	200	N	.04	5	<2	.3	<2	72
HM042CS	150	N	50	<200	500	N	.04	9	<2	.3	<2	97
HM043CS	100	N	30	N	150	N	.04	<5	<2	.5	<2	69
HM044CS	100	N	50	<200	200	N	.04	5	<2	.4	<2	95
HM045CS	50	N	30	N	200	N	.02	<5	<2	.2	<2	69
HM046SS	100	N	50	N	300	N	.02	<5	<2	.4	<2	120

Table 3. Results of analyses of stream-sediment samples from the Hawk Mountain Wilderness Study Area, Harney County, Oregon.--Continued

Sample	Latitude	Longitude	Ca-pct.	Fe-pct.	Mg-pct.	Na-pct.	P-pct.	Ti-pct.	Ag-ppm	As-ppm
			s	s	s	s	s	s	s	s
HM047SS	42 3 5	119 5 35	1.5	7	1.0	--	--	>1.0	N	N
HM048SS	42 2 52	119 5 59	1.0	5	1.0	--	--	1.0	N	N
HM049SS	42 2 59	119 6 12	1.5	7	1.0	--	--	>1.0	N	N
HM050SS	42 3 38	119 6 0	1.5	5	1.0	--	--	>1.0	N	N
HM051HS	42 5 34	119 2 58	1.5	3	.7	--	--	>1.0	N	N
HM052HS	42 5 23	119 1 50	1.5	5	.7	--	--	>1.0	N	N
HM053HS	42 6 2	119 0 47	.5	20	1.0	--	--	>1.0	N	N
HM054HS	42 5 30	119 0 19	2.0	20	1.0	--	--	>1.0	N	N
HM055HS	42 4 24	118 58 17	.7	2	.5	--	--	1.0	N	N
HM056HS	42 0 38	119 2 36	1.0	5	1.0	--	--	>1.0	N	N
HM057HS	42 0 10	119 3 9	2.0	5	1.0	--	--	1.0	N	N
HM058HS	42 0 20	119 4 28	1.5	3	1.0	--	--	.7	N	N
HM059HS	42 0 37	119 5 53	1.0	10	.7	--	--	>1.0	N	N
HM060HS	42 4 58	119 8 40	1.5	7	1.0	--	--	>1.0	N	N
HM061HS	42 6 35	119 6 56	1.0	7	.7	--	--	>1.0	N	N
HM062HS	42 6 53	119 8 32	1.5	5	1.0	--	--	>1.0	N	N
HM063HS	42 6 26	119 9 18	1.5	3	.7	--	--	.5	N	N
HM064SS	42 1 33	119 5 43	2.0	10	1.0	--	--	>1.0	N	N
HM065SS	42 1 11	119 5 40	2.0	7	1.5	--	--	>1.0	N	N
HM066HS	42 2 57	119 7 9	2.0	5	1.0	--	--	>1.0	N	N
HM067HS	42 3 38	119 6 2	2.0	7	1.0	--	--	>1.0	N	N
HM068SS	42 3 28	119 8 18	1.5	5	1.0	--	--	>1.0	N	N
HM069HS	42 1 16	119 10 11	2.0	5	1.0	--	--	>1.0	N	N
HM070SS	42 1 5	119 14 8	1.5	3	.7	--	--	.7	N	N
HM071SS	42 1 23	119 13 59	2.0	5	1.0	--	--	>1.0	N	N
HM072SS	42 1 24	119 13 37	1.5	7	1.0	--	--	>1.0	N	N
HM073SS	42 1 57	119 9 12	1.5	5	.7	--	--	>1.0	N	N
HM074SS	42 3 53	119 10 11	2.0	5	1.0	--	--	>1.0	N	N
HM075HS	42 3 51	119 10 15	1.0	3	.7	--	--	1.0	N	N
HM076SS	42 4 3	119 9 30	1.5	5	1.0	--	--	>1.0	N	N
HM077SS	42 3 4	119 11 31	2.0	15	1.5	--	--	>1.0	N	N
HM078HS	42 3 6	119 11 37	2.0	5	1.0	--	--	1.0	N	N
HM079SS	42 2 28	119 11 35	2.0	3	1.0	--	--	1.0	N	N
HM080SS	42 2 3	119 12 11	2.0	7	1.0	--	--	>1.0	N	N
HM081SS	42 2 17	119 14 45	2.0	5	1.0	--	--	>1.0	N	N
HM082SS	42 5 9	119 11 48	2.0	7	1.0	--	--	1.0	N	N
HM083SS	42 4 48	119 11 5	2.0	7	1.0	--	--	>1.0	N	N
HM084SS	42 5 54	119 6 4	1.0	3	.5	--	--	1.0	N	N
HM085SS	42 5 2	119 4 6	1.5	3	.7	--	--	1.0	N	N
HM201S	42 3 24	119 10 32	2.0	5	1.5	2	.2	1.0	N	N
HM202S	42 2 34	119 11 38	2.0	5	1.5	2	<.2	>1.0	N	N
HM203S	42 3 7	119 11 30	2.0	7	3.0	3	<.2	>1.0	N	N
HM204S	42 3 6	119 11 40	1.5	5	2.0	3	.2	1.0	N	N
HM205S	42 2 46	119 11 40	2.0	5	1.0	5	N	.5	N	N
HM206S	42 3 31	119 11 28	2.0	5	1.0	3	.2	.5	N	N

Table 3. Results of analyses of stream-sediment samples from the Hawk Mountain Wilderness Study Area, Harney County, Oregon.--Continued

Sample	Au-ppm s	B-ppm s	Ba-ppm s	Be-ppm s	Bi-ppm s	Cd-ppm s	Co-ppm s	Cr-ppm s	Cu-ppm s	Ga-ppm s	Ge-ppm s
HM047SS	N	50	700	2.0	N	N	20	50	100	--	--
HM048SS	N	30	500	1.5	N	N	20	20	20	--	--
HM049SS	N	30	500	2.0	N	N	20	70	30	--	--
HM050SS	N	50	500	2.0	N	N	20	70	30	--	--
HM051HS	N	30	500	2.0	N	N	15	50	20	--	--
HM052HS	N	50	500	1.5	N	N	20	50	20	--	--
HM053HS	N	50	500	1.0	N	N	30	20	50	--	--
HM054HS	N	30	1,000	1.0	N	N	20	50	50	--	--
HM055HS	N	100	300	2.0	N	N	<10	10	10	--	--
HM056HS	N	30	500	1.5	N	N	20	20	20	--	--
HM057HS	N	50	500	1.5	N	N	20	50	20	--	--
HM058HS	N	30	500	1.0	N	N	15	50	30	--	--
HM059HS	N	50	500	1.5	N	N	20	50	30	--	--
HM060HS	N	70	500	2.0	N	N	20	70	30	--	--
HM061HS	N	50	500	1.0	N	N	20	20	50	--	--
HM062HS	N	70	500	1.5	N	N	20	100	50	--	--
HM063HS	N	70	500	2.0	N	N	20	50	50	--	--
HM064SS	N	30	500	1.5	N	N	30	100	50	--	--
HM065SS	N	50	500	1.5	N	N	30	50	70	--	--
HM066HS	N	50	500	1.5	N	N	30	70	50	--	--
HM067HS	N	100	500	2.0	N	N	30	100	50	--	--
HM068SS	N	70	500	2.0	N	N	30	100	50	--	--
HM069HS	N	100	500	2.0	N	N	20	100	50	--	--
HM070SS	N	100	500	2.0	N	N	15	70	50	--	--
HM071SS	N	70	500	2.0	N	N	30	100	50	--	--
HM072SS	N	50	300	2.0	N	N	20	50	30	--	--
HM073SS	N	50	500	2.0	N	N	20	70	20	--	--
HM074SS	N	50	500	1.5	N	N	30	50	20	--	--
HM075HS	N	100	300	2.0	N	N	20	50	20	--	--
HM076SS	N	70	500	1.5	N	N	30	70	50	--	--
HM077SS	N	50	300	1.5	N	N	50	100	50	--	--
HM078HS	N	50	300	1.0	N	N	20	50	30	--	--
HM079SS	N	50	500	1.5	N	N	20	50	20	--	--
HM080SS	N	50	500	1.5	N	N	30	100	50	--	--
HM081SS	N	50	500	1.0	N	N	20	100	30	--	--
HM082SS	N	50	500	1.5	N	N	30	50	50	--	--
HM083SS	N	100	500	2.0	N	N	20	100	50	--	--
HM084SS	N	50	500	2.0	N	N	15	20	15	--	--
HM085SS	N	50	500	2.0	N	N	15	30	20	--	--
HM201S	N	50	300	1.5	N	N	20	70	50	15	N
HM202S	N	50	200	1.5	N	N	15	50	20	15	N
HM203S	N	30	300	1.5	N	N	20	70	50	20	N
HM204S	N	30	300	1.5	N	N	30	70	30	15	N
HM205S	N	50	700	1.5	N	N	20	15	50	70	N
HM206S	N	30	500	1.5	N	N	20	30	50	50	N

Table 3. Results of analyses of stream-sediment samples from the Hawk Mountain Wilderness Study Area, Harney County, Oregon.--Continued

Sample	La-ppm s	Mo-ppm s	Mn-ppm s	Nb-ppm s	Ni-ppm s	Pb-ppm s	Sb-ppm s	Sc-ppm s	Sn-ppm s	Sr-ppm s	Th-ppm s
HM047SS	100	5	3,000	<20	20	50	N	15	N	300	N
HM048SS	100	5	1,000	<20	15	50	N	15	N	200	N
HM049SS	100	7	2,000	30	20	50	N	20	N	300	N
HM050SS	100	7	3,000	20	20	70	N	15	N	300	N
HM051HS	<50	5	1,500	<20	20	30	N	15	N	300	N
HM052HS	50	<5	1,500	N	20	50	N	15	N	300	N
HM053HS	N	<5	>10,000	50	15	50	N	50	N	200	N
HM054HS	<50	5	5,000	50	20	50	N	30	N	500	N
HM055HS	100	5	1,000	N	15	70	N	7	N	150	N
HM056HS	<50	7	1,500	<20	15	30	N	15	N	300	N
HM057HS	50	<5	2,000	<20	15	50	N	15	N	500	N
HM058HS	<50	N	700	N	15	70	N	15	N	300	N
HM059HS	100	5	2,000	20	15	50	N	20	N	200	N
HM060HS	100	5	2,000	<20	20	50	N	15	N	200	N
HM061HS	50	5	2,000	30	15	50	N	20	N	200	N
HM062HS	100	<5	2,000	20	30	50	N	20	N	300	N
HM063HS	70	<5	3,000	<20	20	50	N	15	N	300	N
HM064SS	70	5	3,000	<20	20	20	N	20	N	500	N
HM065SS	50	<5	2,000	30	20	30	N	20	N	500	N
HM066HS	70	<5	2,000	<20	20	50	N	15	N	500	N
HM067HS	70	5	3,000	20	20	50	N	20	N	500	N
HM068SS	70	<5	1,500	<20	20	50	N	20	N	300	N
HM069HS	100	<5	1,500	20	20	50	N	20	N	300	N
HM070SS	70	5	1,000	<20	20	50	N	15	N	200	N
HM071SS	100	<5	2,000	N	20	50	N	20	N	500	N
HM072SS	100	<5	2,000	<20	20	30	N	15	N	200	N
HM073SS	100	5	2,000	20	20	50	N	20	N	500	N
HM074SS	100	<5	2,000	<20	15	50	N	15	N	500	N
HM075HS	100	5	2,000	<20	15	70	N	15	N	200	N
HM076SS	50	N	1,500	20	20	50	N	20	N	300	N
HM077SS	70	N	3,000	N	30	30	N	20	N	300	N
HM078HS	50	5	2,000	N	20	30	N	15	N	300	N
HM079SS	70	<5	1,500	N	20	30	N	10	N	300	N
HM080SS	100	N	3,000	N	20	30	N	20	N	300	N
HM081SS	50	N	1,000	<20	20	20	N	15	N	500	N
HM082SS	<50	N	1,500	<20	20	50	N	15	N	300	N
HM083SS	50	N	3,000	N	30	50	N	15	N	500	N
HM084SS	50	5	1,000	<20	15	30	N	10	N	200	N
HM085SS	70	5	1,000	<20	20	50	N	15	N	300	N
HM201S	50	<5	2,000	<20	20	30	N	15	N	500	N
HM202S	70	<5	2,000	<20	10	30	N	15	N	500	N
HM203S	<50	<5	5,000	N	15	30	N	20	N	1,000	N
HM204S	50	<5	3,000	<20	15	30	N	15	N	500	N
HM205S	50	<5	2,000	<20	20	70	N	10	N	500	N
HM206S	50	<5	2,000	<20	20	50	N	10	N	700	N

Table 3. Results of analyses of stream-sediment samples from the Hawk Mountain Wilderness Study Area, Harney County, Oregon.--Continued

Sample	V-ppm s	W-ppm s	Y-ppm s	Zn-ppm s	Zr-ppm s	Au-ppm aa	Hg-ppm aa	As-ppm icp	Bi-ppm icp	Cd-ppm icp	Sb-ppm icp	Zn-ppm icp
HM047SS	100	N	50	<200	200	N	.02	<5	<2	.2	<2	85
HM048SS	100	N	30	N	100	N	.02	<5	<2	.4	<2	120
HM049SS	150	N	50	<200	500	N	.02	<5	<2	.4	<2	110
HM050SS	100	N	70	200	500	N	.04	<5	<2	.4	<2	180
HM051HS	100	N	30	N	150	N	.02	6	<2	.2	<2	53
HM052HS	100	N	50	N	200	N	.02	<5	<2	.2	<2	59
HM053HS	300	N	50	H	>1,000	N	N	<5	3	.9	<2	330
HM054HS	150	N	50	H	1,000	N	.02	<5	<2	.2	<2	160
HM055HS	20	N	50	N	200	N	.02	<5	<2	<.1	<2	28
HM056HS	100	N	20	N	300	N	N	<5	<2	.4	<2	120
HM057HS	70	N	30	N	150	N	N	<5	<2	.3	<2	73
HM058HS	100	N	20	N	150	N	N	<5	<2	.1	<2	57
HM059HS	150	N	50	200	1,000	N	.02	6	4	.3	<2	280
HM060HS	70	N	50	<200	200	N	.02	7	<2	.3	<2	78
HM061HS	100	N	50	<200	1,000	N	.02	<5	<2	.8	<2	290
HM062HS	100	N	50	N	700	N	.02	<5	<2	.3	<2	84
HM063HS	50	N	30	N	200	N	.04	5	3	.4	<2	70
HM064SS	150	N	30	<200	500	N	.02	<5	<2	.4	<2	100
HM065SS	150	N	30	N	300	N	N	<5	4	.6	<2	150
HM066HS	100	N	30	N	200	N	.02	<5	3	.4	<2	46
HM067HS	100	N	30	<200	300	N	.02	<5	<2	.4	<2	100
HM068SS	100	N	30	<200	200	N	.04	<5	<2	.5	<2	69
HM069HS	100	N	30	N	300	N	.02	<5	<2	.3	<2	53
HM070SS	70	N	30	N	200	N	.02	<5	<2	.4	<2	56
HM071SS	100	N	50	N	150	N	.02	<5	<2	.4	<2	56
HM072SS	100	N	30	N	200	N	N	<5	<2	.3	<2	53
HM073SS	100	N	50	N	500	N	.02	<5	<2	.4	<2	58
HM074SS	100	N	30	<200	150	N	.04	<5	<2	.5	<2	69
HM075HS	100	N	50	N	500	N	.02	<5	<2	.4	<2	69
HM076SS	100	N	30	N	300	N	.02	<5	<2	.4	<2	66
HM077SS	150	N	20	<200	150	N	.04	<5	<2	.7	<2	120
HM078HS	100	N	30	N	200	N	.02	<5	<2	.4	<2	58
HM079SS	100	N	30	N	150	N	.02	6	<2	.4	<2	60
HM080SS	150	N	50	N	300	N	.02	6	3	.5	<2	120
HM081SS	100	N	30	N	200	N	.02	<5	<2	.4	<2	53
HM082SS	100	N	30	N	150	N	.02	<5	<2	.5	<2	60
HM083SS	100	N	30	N	300	N	.04	5	<2	.7	<2	73
HM084SS	50	N	30	<200	200	N	.02	<5	<2	.3	<2	91
HM085SS	70	N	30	<200	150	N	.02	<5	<2	.3	<2	66
HM201S	100	N	30	N	300	<.002	.03	<5	<2	.5	<2	63
HM202S	100	N	30	N	500	<.002	.03	<5	<2	.4	<2	67
HM203S	200	N	20	N	150	<.002	.03	<5	<2	.5	<2	110
HM204S	150	N	20	N	150	<.002	.03	<5	<2	.4	<2	65
HM205S	150	N	30	N	200	<.002	.04	10	<2	.4	<2	58
HM206S	100	N	30	N	150	<.002	.04	6	<2	.8	<2	64

Table 3. Results of analyses of stream-sediment samples from the Hawk Mountain Wilderness Study Area, Harney County, Oregon.--Continued

Sample	Latitude	Longitude	Ca-pct. s	Fe-pct. s	Mg-pct. s	Na-pct. s	P-pct. s	Ti-pct. s	Ag-ppm s	As-ppm s
HM207S	42 3 20	119 12 10	2.0	7	1.0	3	<.2	.5	N	N
HM208S	42 3 54	119 10 33	2.0	7	1.0	3	.2	.7	N	N
HM209S	42 4 28	119 9 47	2.0	5	1.0	5	<.2	.7	N	N

Sample	Au-ppm s	B-ppm s	Ba-ppm s	Be-ppm s	Bi-ppm s	Cd-ppm s	Co-ppm s	Cr-ppm s	Cu-ppm s	Ga-ppm s	Ge-ppm s
HM207S	N	70	700	2.0	N	N	20	70	50	70	N
HM208S	N	50	700	2.0	N	N	20	50	50	70	N
HM209S	N	50	700	2.0	N	N	15	100	50	70	N

Sample	La-ppm s	Mo-ppm s	Mn-ppm s	Nb-ppm s	Ni-ppm s	Pb-ppm s	Sb-ppm s	Sc-ppm s	Sn-ppm s	Sr-ppm s	Th-ppm s
HM207S	70	<5	2,000	<20	30	70	N	15	N	700	N
HM208S	70	<5	3,000	<20	30	70	N	20	N	1,000	N
HM209S	70	<5	2,000	<20	30	100	N	20	N	700	N

Sample	V-ppm s	W-ppm s	Y-ppm s	Zn-ppm s	Zr-ppm s	Au-ppm aa	Hg-ppm aa	As-ppm icp	Bi-ppm icp	Cd-ppm icp	Sb-ppm icp	Zn-ppm icp
HM207S	150	N	50	N	200	<.002	.02	8	<2	.5	<2	49
HM208S	150	N	50	N	200	<.002	<.02	8	<2	.6	<2	62
HM209S	150	N	50	N	200	<.002	.02	7	<2	.5	<2	64

Table 4. Results of analyses of heavy-mineral-concentrate samples from the Hawk Mountain Wilderness Study Area, Harney County, Oregon.

[N, not detected; <, detected but below the limit of determination shown; >, determined to be greater than the value shown.]

Sample	Latitude	Longitude	Fe-pct.	Mg-pct.	Ca-pct.	Ti-pct.	Na-pct.	P-pct.	Mn-ppm	Ag-ppm	As-ppm	Au-ppm
			s	s	s	s	s	s	s	s	s	s
HM001CC3	42 0 28	118 52 40	.5	.30	5.0	.50	--	--	200	N	N	N
HM002CC3	42 0 46	118 53 31	.7	.50	1.0	.50	--	--	300	N	N	N
HM003CC3	42 1 19	118 53 51	.7	.50	5.0	1.00	--	--	300	N	N	N
HM004CC3	42 1 31	118 54 52	.7	.50	5.0	.50	--	--	200	N	N	N
HM006CC3	42 2 20	118 55 22	.5	.20	5.0	.30	--	--	200	N	N	N
HM007CC3	42 2 54	118 56 43	.5	.50	7.0	.50	--	--	500	N	N	N
HM008CC3	42 2 57	118 56 47	1.0	.50	7.0	1.00	--	--	300	N	N	N
HM009CC3	42 3 23	118 57 45	.5	.20	10.0	.20	--	--	200	N	N	N
HM010CC3	42 3 33	118 58 9	.5	.30	7.0	.50	--	--	200	N	N	N
HM011CC3	42 1 14	119 8 46	.5	.10	7.0	.20	--	--	200	N	N	N
HM012CC3	42 2 55	119 8 1	.5	.15	7.0	.20	--	--	200	N	N	N
HM013CC3	42 3 24	119 7 42	.5	.10	5.0	.15	--	--	150	N	N	N
HM014CC3	42 4 50	119 7 40	.7	.10	1.5	.50	--	--	200	N	N	N
HM015CC3	42 5 20	119 6 33	.5	.07	1.0	.15	--	--	150	N	N	N
HM016CC3	42 5 17	119 6 26	.5	.20	1.0	.20	--	--	200	N	N	N
HM017CC3	42 4 43	119 12 4	.5	.15	5.0	.30	--	--	150	N	N	N
HM018CC3	42 4 43	119 12 35	.5	.15	5.0	.30	--	--	150	N	N	N
HM019CC3	42 0 45	118 55 29	.5	.30	3.0	.20	--	--	200	N	N	N
HM020CC3	42 0 48	118 55 33	.5	.20	3.0	.20	--	--	200	N	N	N
HM021CC3	42 2 15	118 57 3	.5	.07	2.0	.10	--	--	100	N	N	N
HM022CC3	42 2 11	118 57 0	.5	.20	5.0	.20	--	--	200	N	N	N
HM023CC3	42 1 51	118 57 38	.5	.20	3.0	.15	--	--	150	N	N	N
HM024CC3	42 1 33	118 58 10	.5	.10	5.0	.10	--	--	150	N	N	N
HM025CC3	42 1 34	118 58 14	.7	.50	5.0	.15	--	--	200	N	N	N
HM026CC3	42 1 45	118 58 39	.5	.10	5.0	.15	--	--	150	N	N	N
HM027CC3	42 1 42	118 58 43	.7	.10	5.0	.15	--	--	150	N	N	N
HM028CC3	42 1 5	118 59 31	.5	.05	3.0	.05	--	--	100	N	N	N
HM029CC3	42 1 2	118 59 25	.7	.20	3.0	.10	--	--	150	N	N	N
HM030CC3	42 0 30	119 0 15	.7	.20	5.0	.15	--	--	150	N	N	N
HM031CC3	42 0 33	119 1 40	.5	.30	2.0	1.00	--	--	300	N	N	N
HM032CC3	42 1 36	119 1 53	.5	.10	1.5	.20	--	--	200	N	N	N
HM033CC3	42 2 36	118 59 4	.5	.15	3.0	.50	--	--	300	N	N	N
HM034CC3	42 1 54	118 59 39	.5	.20	2.0	.50	--	--	300	N	N	N
HM035CC3	42 2 17	119 0 22	.7	.20	1.0	.50	--	--	300	N	N	N
HM036CC3	42 4 3	118 59 21	.7	.50	2.0	.50	--	--	300	N	N	N
HM037CC3	42 3 59	118 59 19	.5	.10	2.0	.30	--	--	150	N	N	N
HM038CC3	42 3 57	118 59 15	.5	.07	3.0	.15	--	--	200	N	N	N
HM039CC3	42 4 48	119 0 23	.5	.07	2.0	.10	--	--	100	N	N	N
HM040CC3	42 4 13	119 0 21	.7	.20	3.0	.20	--	--	200	N	N	N
HM041CC3	42 3 42	119 0 15	.5	.30	2.0	.20	--	--	200	N	N	N
HM042CC3	42 2 45	119 2 29	.5	.05	3.0	.10	--	--	150	N	N	N
HM043CC3	42 2 12	119 3 27	.7	.20	1.5	.50	--	--	200	N	N	N
HM044CC3	42 1 3	119 4 4	.5	.10	1.5	.05	--	--	150	N	N	N
HM045CC3	42 2 35	119 4 23	.7	.20	1.5	.20	--	--	200	N	N	N
HM046SC3	42 3 24	119 4 43	.5	.20	1.0	.20	--	--	300	N	N	N

Table 4. Results of analyses of heavy-mineral-concentrate samples from the Hawk Mountain Wilderness Study Area, Harney County, Oregon.--Continued

Sample	B-ppm s	Ba-ppm s	Be-ppm s	Bi-ppm s	Cd-ppm s	Co-ppm s	Cr-ppm s	Cu-ppm s	Ga-ppm s	Ge-ppm s	La-ppm s	Mo-ppm s	Nb-ppm s
HM001CC3	50	500	3	N	N	N	100	N	--	--	<100	N	N
HM002CC3	50	500	2	N	N	N	<20	N	--	--	150	N	N
HM003CC3	20	300	7	N	N	N	20	N	--	--	100	N	N
HM004CC3	50	700	2	N	N	N	20	N	--	--	<100	N	N
HM006CC3	70	500	15	N	N	N	<20	N	--	--	<100	N	N
HM007CC3	50	3,000	10	N	N	N	70	N	--	--	100	N	N
HM008CC3	70	1,000	3	N	N	N	70	N	--	--	100	N	N
HM009CC3	70	500	10	N	N	N	20	N	--	--	100	N	N
HM010CC3	50	500	10	N	N	N	20	N	--	--	100	N	N
HM011CC3	50	500	2	70	N	N	<20	N	--	--	100	N	N
HM012CC3	70	500	2	50	N	N	<20	N	--	--	100	N	N
HM013CC3	30	500	3	N	N	N	<20	N	--	--	<100	N	N
HM014CC3	50	500	7	N	N	N	<20	N	--	--	<100	N	N
HM015CC3	30	300	30	N	N	N	<20	N	--	--	<100	N	N
HM016CC3	50	500	10	300	N	N	<20	N	--	--	<100	N	N
HM017CC3	20	500	<2	N	N	N	<20	N	--	--	<100	N	N
HM018CC3	20	500	<2	N	N	N	<20	N	--	--	<100	N	N
HM019CC3	20	500	2	N	N	N	20	N	--	--	<100	N	N
HM020CC3	20	700	3	N	N	N	<20	N	--	--	<100	N	N
HM021CC3	30	700	7	N	N	N	<20	N	--	--	N	N	N
HM022CC3	20	1,000	5	N	N	N	<20	N	--	--	<100	N	N
HM023CC3	50	700	5	N	N	N	<20	N	--	--	<100	N	N
HM024CC3	30	700	<2	N	N	N	<20	N	--	--	<100	N	N
HM025CC3	30	700	3	N	N	N	<20	N	--	--	<100	N	N
HM026CC3	20	500	5	N	N	N	<20	N	--	--	<100	N	N
HM027CC3	30	700	5	N	N	N	<20	N	--	--	<100	N	N
HM028CC3	50	700	<2	N	N	N	<20	N	--	--	N	N	N
HM029CC3	30	700	<2	N	N	N	<20	N	--	--	<100	N	N
HM030CC3	20	1,000	5	N	N	N	<20	N	--	--	<100	N	N
HM031CC3	20	500	15	N	N	N	30	N	--	--	200	N	N
HM032CC3	20	700	10	N	N	N	20	N	--	--	<100	N	N
HM033CC3	20	300	15	N	N	N	30	N	--	--	200	N	N
HM034CC3	20	500	10	N	N	N	50	N	--	--	200	N	N
HM035CC3	20	200	30	N	N	N	30	N	--	--	200	N	N
HM036CC3	20	300	20	N	N	N	30	N	--	--	200	N	N
HM037CC3	20	700	7	N	N	N	<20	N	--	--	<100	N	N
HM038CC3	20	500	2	N	N	N	<20	N	--	--	N	N	N
HM039CC3	20	700	2	N	N	N	<20	N	--	--	N	N	N
HM040CC3	20	500	15	N	N	N	20	N	--	--	<100	N	N
HM041CC3	100	300	10	N	N	N	<20	N	--	--	<100	N	N
HM042CC3	30	700	<2	N	N	N	<20	N	--	--	N	N	N
HM043CC3	20	300	20	N	N	N	20	N	--	--	200	N	N
HM044CC3	30	700	<2	N	N	N	<20	N	--	--	N	N	N
HM045CC3	30	700	15	N	N	N	50	N	--	--	100	N	N
HM046SC3	30	1,000	3	N	N	N	<20	N	--	--	<100	N	N

Table 4. Results of analyses of heavy-mineral-concentrate samples from the Hawk Mountain Wilderness Study Area, Harney County, Oregon.--Continued

Sample	Ni-ppm s	Pb-ppm s	Pd-ppm s	Pt-ppm s	Sb-ppm s	Sc-ppm s	Sn-ppm s	Sr-ppm s	V-ppm s	W-ppm s	Y-ppm s	Zn-ppm s	Zr-ppm s	Th-ppm s
HM001CC3	15	N	--	--	N	70	N	3,000	30	N	1,000	N	>2,000	N
HM002CC3	15	N	--	--	N	50	30	3,000	30	N	1,000	N	>2,000	N
HM003CC3	20	N	--	--	N	150	N	2,000	50	N	>5,000	N	>2,000	N
HM004CC3	15	N	--	--	N	<10	N	2,000	30	N	500	N	>2,000	N
HM006CC3	30	N	--	--	N	70	N	3,000	30	N	1,000	N	>2,000	N
HM007CC3	20	N	--	--	N	50	N	3,000	50	N	1,000	N	>2,000	N
HM008CC3	15	N	--	--	N	<10	N	2,000	50	N	700	N	>2,000	N
HM009CC3	15	N	--	--	N	50	N	2,000	30	N	1,000	N	>2,000	N
HM010CC3	10	N	--	--	N	50	N	2,000	30	N	1,000	N	>2,000	N
HM011CC3	20	N	--	--	N	N	N	2,000	30	N	300	N	>2,000	N
HM012CC3	10	N	--	--	N	N	70	2,000	30	N	500	N	>2,000	N
HM013CC3	15	N	--	--	N	N	N	2,000	20	N	700	N	>2,000	N
HM014CC3	20	N	--	--	N	70	N	2,000	30	N	700	N	>2,000	N
HM015CC3	15	N	--	--	N	100	N	1,000	20	N	2,000	N	>2,000	N
HM016CC3	20	N	--	--	N	20	1,000	1,000	20	N	1,000	N	>2,000	N
HM017CC3	15	N	--	--	N	<10	20	1,500	70	N	500	N	>2,000	N
HM018CC3	10	N	--	--	N	<10	N	1,500	50	N	500	N	>2,000	N
HM019CC3	10	N	--	--	N	<10	N	1,500	50	N	700	N	>2,000	N
HM020CC3	10	N	--	--	N	<10	N	1,500	50	N	700	N	>2,000	N
HM021CC3	10	N	--	--	N	<10	N	1,500	<20	N	500	N	>2,000	N
HM022CC3	20	N	--	--	N	<10	N	1,500	50	N	700	N	>2,000	N
HM023CC3	<10	N	--	--	N	<10	N	1,500	30	N	700	N	>2,000	N
HM024CC3	<10	N	--	--	N	<10	N	1,000	<20	N	200	N	>2,000	N
HM025CC3	<10	N	--	--	N	<10	N	1,500	50	N	500	N	>2,000	N
HM026CC3	<10	N	--	--	N	20	N	1,500	30	N	1,000	N	>2,000	N
HM027CC3	20	N	--	--	N	<10	N	2,000	50	N	700	N	>2,000	N
HM028CC3	20	N	--	--	N	<10	N	1,000	<20	N	100	N	>2,000	N
HM029CC3	<10	N	--	--	N	<10	N	1,000	30	N	70	N	>2,000	N
HM030CC3	15	N	--	--	N	<10	N	1,500	30	N	1,000	N	>2,000	N
HM031CC3	20	100	--	--	N	70	100	1,500	50	N	1,000	N	>2,000	<200
HM032CC3	20	N	--	--	N	50	50	1,500	30	N	1,000	N	>2,000	<200
HM033CC3	20	N	--	--	N	70	N	1,000	50	N	1,500	N	>2,000	<200
HM034CC3	30	N	--	--	N	100	N	500	50	N	2,000	N	>2,000	<200
HM035CC3	50	N	--	--	N	150	<20	500	50	N	3,000	N	>2,000	200
HM036CC3	20	N	--	--	N	100	100	500	50	N	3,000	N	>2,000	<200
HM037CC3	20	N	--	--	N	50	N	2,000	20	N	2,000	N	>2,000	<200
HM038CC3	<10	N	--	--	N	<10	N	1,000	30	N	300	N	>2,000	N
HM039CC3	10	N	--	--	N	<10	100	1,000	20	N	200	N	>2,000	N
HM040CC3	20	N	--	--	N	70	N	2,000	50	N	1,500	N	>2,000	N
HM041CC3	20	N	--	--	N	<10	N	1,500	50	N	1,000	N	>2,000	N
HM042CC3	15	N	--	--	N	<10	N	1,500	30	N	200	N	>2,000	N
HM043CC3	30	N	--	--	N	70	20	1,000	50	N	1,500	N	>2,000	300
HM044CC3	15	N	--	--	N	<10	N	700	20	N	200	N	>2,000	N
HM045CC3	30	N	--	--	N	50	30	1,000	50	N	700	N	>2,000	N
HM046SC3	15	N	--	--	N	30	N	1,000	30	N	700	N	>2,000	N

Table 4. Results of analyses of heavy-mineral-concentrate samples from the Hawk Mountain Wilderness Study Area, Harney County, Oregon.--Continued

Sample	Latitude	Longitude	Fe-pct. s	Mg-pct. s	Ca-pct. s	Ti-pct. s	Na-pct. s	P-pct. s	Mn-ppm s	Ag-ppm s	As-ppm s	Au-ppm s
HM047SC3	42 3 5	119 5 35	.7	.30	2.0	.30	--	--	500	N	N	N
HM048SC3	42 2 52	119 5 59	.5	.05	5.0	.10	--	--	150	N	N	N
HM049SC3	42 2 59	119 6 12	.5	.10	3.0	.20	--	--	200	N	N	N
HM050SC3	42 3 38	119 6 0	.3	.05	1.5	.07	--	--	150	N	N	N
HM051HC3	42 5 34	119 2 58	.7	.15	1.0	.30	--	--	300	N	N	N
HM052HC3	42 5 23	119 1 50	.5	.20	3.0	.20	--	--	200	N	N	N
HM053HC3	42 6 2	119 0 47	.5	.10	2.0	.10	--	--	200	N	N	N
HM054HC3	42 5 30	119 0 19	.5	.10	2.0	.15	--	--	150	N	N	N
HM056HC3	42 0 38	119 2 36	.3	.10	1.0	.20	--	--	200	N	N	N
HM057HC3	42 0 10	119 3 9	.5	.10	1.0	.15	--	--	200	N	N	N
HM058HC3	42 0 20	119 4 28	.7	.50	2.0	.50	--	--	300	N	N	N
HM059HC3	42 0 37	119 5 53	.2	.05	2.0	.10	--	--	100	N	N	N
HM060HC3	42 4 58	119 8 40	1.0	.20	1.0	.70	--	--	700	N	N	N
HM061HC3	42 6 35	119 6 56	.5	.10	1.0	.15	--	--	200	N	N	N
HM062HC3	42 6 53	119 8 32	.5	.10	1.0	.15	--	--	200	N	N	N
HM063HC3	42 6 26	119 9 18	2.0	.70	1.0	>2.00	--	--	1,000	N	N	N
HM064SC3	42 1 33	119 5 43	1.5	.50	2.0	2.00	--	--	500	N	N	N
HM065SC3	42 1 11	119 5 40	1.0	.70	1.0	2.00	--	--	500	N	N	N
HM066HC3*	42 2 57	119 7 9	7.0	5.00	7.0	>5.00	--	--	2,000	N	N	N
HM067HC3	42 3 38	119 6 2	1.0	.30	5.0	.20	--	--	500	N	N	N
HM068SC3*	42 3 28	119 8 18	10.0	5.00	7.0	>5.00	--	--	3,000	N	N	N
HM069HC3	42 1 16	119 10 11	5.0	3.00	5.0	>2.00	--	--	1,500	N	N	N
HM071SC3	42 1 23	119 13 59	2.0	3.00	10.0	1.00	--	--	1,000	N	N	N
HM072SC3	42 1 24	119 13 37	1.5	2.00	7.0	2.00	--	--	700	N	N	N
HM073SC3	42 1 57	119 9 12	2.0	2.00	5.0	2.00	--	--	700	N	N	N
HM074SC3	42 3 53	119 10 11	2.0	2.00	2.0	1.00	--	--	1,000	N	N	N
HM075HC3	42 3 51	119 10 15	2.0	1.50	2.0	1.50	--	--	1,000	N	N	N
HM076SC3	42 4 3	119 9 30	.5	.20	5.0	.20	--	--	200	N	N	N
HM077SC3	42 3 4	119 11 31	1.0	.70	5.0	.30	--	--	200	N	N	N
HM078HC3	42 3 6	119 11 37	1.0	.50	7.0	.30	--	--	300	N	N	N
HM079SC3	42 2 28	119 11 35	1.0	.50	5.0	.20	--	--	300	N	N	N
HM080SC3	42 2 3	119 12 11	.7	.20	5.0	.20	--	--	200	N	N	N
HM081SC3	42 2 17	119 14 45	1.0	1.50	5.0	.70	--	--	500	N	N	N
HM082SC3	42 5 9	119 11 48	1.0	.70	5.0	.50	--	--	500	N	N	N
HM083SC3	42 4 48	119 11 5	2.0	2.00	5.0	2.00	--	--	1,000	N	N	N
HM084SC3	42 5 54	119 6 4	1.0	.50	2.0	.20	--	--	500	N	N	N
HM085SC3	42 5 2	119 4 6	.7	.50	1.5	.20	--	--	500	N	N	N
HM203C	42 3 7	119 11 30	.2	.70	5.0	.30	7	1.5	300	N	N	N
HM204C	42 3 6	119 11 40	.2	.10	10.0	.15	10	2.0	300	N	N	N
HM205	42 2 46	119 11 40	5.0	1.50	5.0	2.00	3	.7	1,000	N	N	N
HM206	42 3 31	119 11 28	10.0	3.00	5.0	>2.00	2	<.5	3,000	N	N	N
HM207	42 3 20	119 12 10	15.0	7.00	5.0	>2.00	2	<.5	2,000	N	N	N
HM208	42 3 54	119 10 33	5.0	2.00	5.0	2.00	3	.7	700	N	N	N
HM209	42 4 28	119 9 47	10.0	5.00	5.0	>2.00	1	1.0	5,000	N	N	N

*2.5 mg sample used

Table 4. Results of analyses of heavy-mineral-concentrate samples from the Hawk Mountain Wilderness Study Area, Harney County, Oregon.--Continued

Sample	B-ppm s	Ba-ppm s	Be-ppm s	Bi-ppm s	Cd-ppm s	Co-ppm s	Cr-ppm s	Cu-ppm s	Ga-ppm s	Ge-ppm s	La-ppm s	Mo-ppm s	Nb-ppm s
HM047SC3	20	500	10	N	N	N	<20	N	--	--	100	N	N
HM048SC3	20	700	2	N	N	N	<20	N	--	--	N	N	N
HM049SC3	20	500	3	N	N	N	<20	N	--	--	N	N	N
HM050SC3	20	700	2	N	N	N	<20	N	--	--	N	N	N
HM051HC3	20	500	7	N	N	N	<20	N	--	--	N	N	N
HM052HC3	30	500	5	N	N	N	<20	N	--	--	<100	N	N
HM053HC3	30	700	5	N	N	N	<20	N	--	--	N	N	N
HM054HC3	30	700	7	N	N	N	<20	N	--	--	N	N	N
HM056HC3	30	500	10	N	N	N	<20	N	--	--	100	N	N
HM057HC3	30	500	15	N	N	N	<20	N	--	--	100	N	N
HM058HC3	30	500	10	N	N	N	<20	N	--	--	100	N	N
HM059HC3	20	1,000	2	N	N	N	<20	N	--	--	N	N	N
HM060HC3	50	500	7	5,000	N	N	50	N	--	--	200	N	N
HM061HC3	20	1,000	3	N	N	N	20	100	--	--	N	N	N
HM062HC3	50	500	30	N	N	N	20	<10	--	--	N	N	N
HM063HC3	50	500	2	N	N	N	100	15	--	--	100	N	N
HM064SC3	50	500	30	N	N	N	30	15	--	--	200	N	N
HM065SC3	30	200	70	N	N	N	30	15	--	--	200	N	N
HM066HC3	100	700	10	70	N	20	1,000	70	--	--	5,000	N	N
HM067HC3	70	500	3	N	N	N	<20	<10	--	--	N	N	N
HM068SC3	100	700	5	N	N	20	300	70	--	--	700	N	N
HM069HC3	70	500	2	2,000	N	<20	200	20	--	--	500	N	N
HM071SC3	50	500	2	200	N	<20	200	20	--	--	200	N	N
HM072SC3	70	500	<2	300	N	<20	150	15	--	--	200	N	N
HM073SC3	70	700	2	<20	N	N	100	15	--	--	200	N	N
HM074SC3	50	500	<2	1,500	N	N	100	15	--	--	150	N	N
HM075HC3	50	300	<2	1,000	N	N	150	15	--	--	200	N	N
HM076SC3	70	500	3	<20	N	N	30	10	--	--	100	N	N
HM077SC3	50	500	2	2,000	N	N	50	10	--	--	200	N	N
HM078HC3	70	500	<2	150	N	N	20	15	--	--	100	N	N
HM079SC3	50	300	<2	<20	N	N	30	<10	--	--	<100	N	N
HM080SC3	50	500	<2	30	N	N	<20	<10	--	--	<100	N	N
HM081SC3	100	500	<2	700	N	N	200	15	--	--	300	N	N
HM082SC3	50	500	<2	100	N	N	20	10	--	--	<100	N	N
HM083SC3	50	300	<2	100	N	N	200	20	--	--	500	N	N
HM084SC3	50	500	15	N	N	N	<20	10	--	--	<100	N	N
HM085SC3	70	500	20	N	N	N	20	10	--	--	150	N	N
HM203C	20	500	<2	>2,000	N	N	<20	10	50	N	100	N	N
HM204C	<20	700	2	N	N	N	<20	<10	50	N	<100	N	N
HM205	20	500	<2	<20	N	<20	100	10	50	N	150	<10	N
HM206	<20	500	<2	500	N	30	100	20	70	N	200	<10	<50
HM207	<20	300	<2	N	N	50	200	20	70	N	200	<10	50
HM208	20	500	2	N	N	20	50	<10	50	N	200	<10	N
HM209	70	200	2	500	N	20	200	20	20	N	300	<10	<50

Table 4. Results of analyses of heavy-mineral-concentrate samples from the Hawk Mountain Wilderness Study Area, Harney County, Oregon.--Continued

Sample	Ni-ppm s	Pb-ppm s	Pd-ppm s	Pt-ppm s	Sb-ppm s	Sc-ppm s	Sn-ppm s	Sr-ppm s	V-ppm s	W-ppm s	Y-ppm s	Zn-ppm s	Zr-ppm s	Th-ppm s
HM047SC3	20	N	--	--	N	70	N	1,500	50	N	1,500	N	>2,000	<200
HM048SC3	10	N	--	--	N	<10	N	1,000	30	N	300	N	>2,000	N
HM049SC3	15	N	--	--	N	<10	N	1,500	50	N	700	N	>2,000	N
HM050SC3	15	N	--	--	N	<10	N	1,000	50	N	500	N	>2,000	N
HM051HC3	20	N	--	--	N	70	N	700	50	N	1,000	N	>2,000	N
HM052HC3	20	N	--	--	N	50	N	1,000	50	N	1,000	N	>2,000	N
HM053HC3	20	N	--	--	N	50	N	1,500	30	N	1,000	N	>2,000	N
HM054HC3	20	N	--	--	N	50	N	1,500	50	N	1,000	N	>2,000	N
HM056HC3	30	N	--	--	N	100	N	500	50	N	1,500	N	>2,000	<200
HM057HC3	50	N	--	--	N	100	N	700	50	N	2,000	N	>2,000	<200
HM058HC3	30	N	--	--	N	100	150	700	70	N	1,500	N	>2,000	N
HM059HC3	15	N	--	--	N	<10	N	700	30	N	500	N	>2,000	N
HM060HC3	50	N	--	--	N	100	200	500	70	N	1,500	N	>2,000	N
HM061HC3	15	N	--	--	N	50	300	500	<20	N	700	N	>2,000	N
HM062HC3	50	N	--	--	N	100	N	2,000	30	N	>5,000	N	>2,000	N
HM063HC3	30	N	--	--	N	70	100	1,000	50	N	1,000	N	>2,000	N
HM064SC3	30	N	--	--	N	150	100	1,500	50	N	5,000	N	>2,000	N
HM065SC3	30	N	--	--	N	200	N	700	50	N	>5,000	N	>2,000	N
HM066HC3	100	N	--	--	N	100	N	1,500	500	200	1,500	N	>5,000	N
HM067HC3	20	N	--	--	N	<10	N	1,000	30	N	700	N	>2,000	N
HM068SC3	100	N	--	--	N	100	N	1,500	300	N	1,500	N	>5,000	N
HM069HC3	50	N	--	--	N	50	N	1,500	200	N	700	N	>2,000	N
HM071SC3	30	N	--	--	N	30	N	2,000	100	N	700	N	>2,000	N
HM072SC3	30	N	--	--	N	30	300	2,000	150	N	500	N	>2,000	N
HM073SC3	30	N	--	--	N	50	N	2,000	100	N	700	N	>2,000	N
HM074SC3	30	N	--	--	N	<10	N	1,500	100	N	700	N	>2,000	N
HM075HC3	30	N	--	--	N	<10	30	1,000	150	N	700	N	>2,000	N
HM076SC3	15	N	--	--	N	<10	150	2,000	30	N	700	N	>2,000	N
HM077SC3	20	N	--	--	N	<10	200	2,000	150	N	700	N	>2,000	N
HM078HC3	15	N	--	--	N	<10	N	2,000	70	N	700	N	>2,000	N
HM079SC3	20	N	--	--	N	<10	N	1,000	50	100	300	N	>2,000	N
HM080SC3	10	N	--	--	N	<10	30	1,000	50	N	200	N	>2,000	N
HM081SC3	30	N	--	--	N	<10	20	1,000	100	N	500	N	>2,000	N
HM082SC3	20	100	--	--	N	<10	500	2,000	70	N	500	N	>2,000	N
HM083SC3	50	N	--	--	N	30	150	2,000	100	N	700	N	>2,000	N
HM084SC3	30	N	--	--	N	50	700	2,000	50	N	1,000	N	>2,000	N
HM085SC3	30	N	--	--	N	100	<20	1,500	50	N	1,500	N	>2,000	N
HM203C	<10	30	--	--	N	<10	200	7,000	<20	N	700	N	>2,000	N
HM204C	20	<20	--	--	N	<10	N	10,000	<20	N	700	N	>2,000	N
HM205	20	<20	N	N	N	70	300	2,000	100	N	300	N	>2,000	N
HM206	50	200	N	N	N	100	700	1,500	200	N	300	N	>2,000	N
HM207	100	<20	N	N	N	70	N	1,000	200	N	200	N	>2,000	N
HM208	70	N	N	N	N	50	<20	1,500	100	N	500	N	>2,000	N
HM209	70	70	N	N	N	70	>2,000	1,000	150	N	500	N	>2,000	N

Table 5. Results of analyses of rock samples from the Hawk Mountain Wilderness Study Area, Harney County, Oregon.

Sample	Latitude	Longitude	Fe-pct. s	Mg-pct. s	Ca-pct. s	Ti-pct. s	Na-pct. s	P-pct. s	Mn-ppm s	Ag-ppm s
HM015CR	42 5 20	119 6 33	1.0	.03	.20	.30	--	--	200	N
HM031CR	42 0 33	119 1 40	1.0	.30	.20	.10	--	--	700	N
HM044CR	42 1 3	119 4 4	1.0	.10	.10	.10	--	--	1,000	N
HM054RH	42 5 30	119 0 19	1.0	.02	.05	.10	--	--	300	N
HM059HR1	42 0 37	119 5 53	2.0	.05	.20	.20	--	--	300	N
HM059HR2	42 0 37	119 5 53	1.0	.10	.50	.20	--	--	500	N
HM066HR	42 2 57	119 7 9	3.0	.10	.10	.10	--	--	500	N
HM078HR	42 3 6	119 11 37	1.5	.07	.07	.10	--	--	700	N
HM079SR	42 2 28	119 11 35	5.0	.10	.05	.07	--	--	500	N
HM205R	42 2 46	119 11 40	2.0	.15	.20	.20	5	<.2	700	N
HM206R	42 3 31	110 11 28	1.5	.10	.10	.15	3	<.2	500	N
HM207R	42 3 20	119 12 10	1.5	.10	.10	.15	3	<.2	500	N
HM208R	42 3 54	119 10 33	2.0	.15	.10	.30	5	<.2	700	N
HM209R	42 4 28	119 9 47	2.0	.15	.30	.20	5	<.2	700	N

Sample	As-ppm s	Au-ppm s	B-ppm s	Ba-ppm s	Be-ppm s	Bi-ppm s	Cd-ppm s	Co-ppm s	Cr-ppm s	Cu-ppm s	Ga-ppm s
HM015CR	N	N	50	200	2	N	N	N	<10	7	--
HM031CR	N	N	50	1,500	2	N	N	N	<10	10	--
HM044CR	N	N	70	100	3	N	N	N	<10	5	--
HM054RH	N	N	30	50	2	N	N	N	<10	5	--
HM059HR1	N	N	20	500	2	N	N	N	<10	7	--
HM059HR2	N	N	20	700	1	N	N	N	<10	7	--
HM066HR	N	N	50	100	2	N	N	<10	10	10	--
HM078HR	N	N	70	500	2	N	N	<10	<10	5	--
HM079SR	N	N	30	150	2	N	N	<10	<10	10	--
HM205R	N	N	20	100	3	N	N	N	<10	<5	70
HM206R	N	N	20	200	5	N	N	N	<10	<5	50
HM207R	N	N	20	1,000	5	N	N	N	<10	<5	50
HM208R	N	N	20	150	5	N	N	N	<10	<5	50
HM209R	N	N	15	300	3	N	N	N	<10	<5	50

Table 5. Results of analyses of rock samples from the Hawk Mountain Wilderness Study Area, Harney County, Oregon.--Continued

Sample	Ge-ppm s	La-ppm s	Mo-ppm s	Nb-ppm s	Ni-ppm s	Pb-ppm s	Sb-ppm s	Sc-ppm s	Sn-ppm s	Sr-ppm s	V-ppm s	W-ppm s
HM015CR	--	100	5	<20	<5	20	N	7	N	<100	20	N
HM031CR	--	50	<5	20	7	30	N	7	N	200	15	N
HM044CR	--	150	<5	20	5	30	N	10	N	<100	20	N
HM054RH	--	100	5	30	<5	20	N	5	N	<100	10	N
HM059HR1	--	70	5	20	<5	15	N	7	N	100	50	N
HM059HR2	--	100	<5	20	<5	30	N	7	N	100	20	N
HM066HR	--	70	<5	20	7	15	N	7	N	<100	50	N
HM078HR	--	200	<5	20	<5	30	N	10	N	100	10	<50
HM079SR	--	<50	<5	<20	5	15	N	5	N	100	200	<50
HM205R	N	50	<5	<20	<5	20	N	7	N	N	<10	N
HM206R	N	70	<5	N	<5	20	N	5	N	<100	<10	N
HM207R	N	50	<5	<20	<5	20	N	5	N	100	<10	<50
HM208R	N	50	5	<20	<5	20	N	7	N	<100	<10	N
HM209R	N	50	<5	N	<5	20	N	5	N	<100	10	<50

Sample	Y-ppm s	Zn-ppm s	Zr-ppm s	Th-ppm s	Au-ppm aa	Hg-ppm aa	As-ppm icp	Bi-ppm icp	Cd-ppm icp	Sb-ppm icp	Zn-ppm icp
HM015CR	50	N	200	N	N	N	<5	<2	.4	<2	58
HM031CR	50	N	700	N	N	.02	<5	<2	.2	<2	21
HM044CR	70	N	500	N	N	.02	<5	<2	<.1	<2	33
HM054RH	50	N	500	N	N	N	<5	<2	<.1	<2	67
HM059HR1	20	N	300	N	N	N	7	<2	.3	<2	67
HM059HR2	50	N	500	N	N	N	<5	<2	.1	<2	58
HM066HR	70	N	500	N	N	N	8	<2	<.1	<2	33
HM078HR	70	N	700	N	N	N	<5	<2	<.1	<2	27
HM079SR	30	N	300	N	N	.02	19	<2	.4	<2	34
HM205R	70	N	500	N	<.002	<.02	<5	<2	.1	<2	24
HM206R	20	N	300	N	<.002	<.02	<5	<2	.2	<2	23
HM207R	30	N	700	N	<.002	<.02	<5	<2	<.1	<2	19
HM208R	30	N	500	N	<.002	<.02	<5	<2	.2	<2	25
HM209R	30	N	500	N	<.002	<.02	<5	<2	.2	<2	26

Table 6. Description of rock samples

HM015CR	welded tuff, limonite staining throughout
HM031CR	welded tuff
HM044CR	welded tuff
HM054RH	welded tuff
HM059HR1	welded tuff, thick surface coat of limonite
HM059HR2	welded tuff
HM066HR	welded tuff, limonite staining throughout
HM078HR	welded tuff
HM079SR	welded tuff, about 10-20% brown opal, disseminated limonite
HM205R	welded tuff
HM206R	welded tuff
HM207R	welded tuff
HM208R	welded tuff
HM209R	welded tuff